ARTHROPLASTY UPON THE ELBOW JOINT.

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THE following case illustrates the result of a plastic upon an ankylosed elbow joint one year and four months after the operation.

The patient was an adult man, 48 years old, a farmer and a carpenter by occupation.

The right olecranon was fractured by a fall from a wagon, April 21, 1905. There was at the time very great swelling about the elbow, and considerable displacement forward of the shaft of the ulna. The arm was extended, and covered with wet compresses for eight days. On April 29 the joint was opened through a posterior incision by the attending physician. Three fragments of bone were removed from the joint. An attempt was then made to wire the remaining fragment of the olecranon to the shaft of the ulna. Primary union followed in the superficial parts. The arm was immobilized for two weeks, and then gentle motion was begun. A few days later crepitus was noticed in the region of the fracture. A radiograph was taken, which disclosed a broken wire and the separation of the fragment of the olecranon from the ulnar shaft.

At this time the patient first came under my observation, July 6, 1905.

The elbow joint was almost completely ankylosed at an obtuse angle. There was a little movement possible, both actively and passively at the elbow joint, about 5 degrees.

In July, 1905, I did an arthroplasty upon the elbow joint by the following technique:

Steps in the operation of arthroplasty: Exposure of the joint by section of the olecranon; preparation of the joint and bony surfaces; making the fascial-fat flap; placing of the flap; suture of the olecranon fragment; closure of the joint; immobilization.

A long posterior incision was made, dividing all structures to the fascia, excepting that at that part of the incision over the back of the upper arm only the subcutaneous fat tissue was exposed. The olecranon was separated from the shaft of the ulna at the original point of fracture. Sharp flexion of the elbow exposed the joint surfaces, whereupon all adventitious bony and periosteal tissue was removed. The synovial membrane of the joint was thoroughly excised, a small bit of bone from the tip of the coronoid process was removed, and the ends of the bones were thoroughly freed.

The skin over the back of the upper arm was reflected laterally the whole length of the incision. A rectangular flap was then taken from the posterior surface of the upper arm, about three inches wide and five or six inches long, which included the fascia of the upper arm together with a small amount of subcutaneous fat tissue left when reflecting the skin flaps in the primary incision. When this flap was reflected the muscles of the back of the forearm were completely exposed. The pedicle of this flap was attached just above the posterior surface of the elbow joint.

The flap was rotated and swung into the joint, and placed between the ends of the exposed bones. The flap covered the lower end of the humerus, and the sigmoid cavity of the ulna and the upper end of the radius. The flap was held in position by a few interrupted sutures to the farther side of the joint.

The olecranon fracture was sutured by aluminum bronze wire. The fascia and ligaments about the joint were approximated so as to completely close the joint. The subcutaneous tissues were closed by interrupted sutures. The skin was sutured with silk worm gut. The wound was not drained. The arm was fixed at a right angle by an internal angular splint. Gentle passive motion was given at the end of about ten days.

At the present time, one year and four months following the operation, the man has a strong and useful arm, with which he is able to do all the work about a small farm.

The amount of movement at the elbow joint is seen in the accompanying photographs. Figs. 1 and 2 show the amount of motion three months following the operation. Figs. 3 and 4 show the amount of movement at the present time, one year and four months after the arthroplasty. In Figs. 3 and 4 is also illus-

FIG. 1.—Voluntary extension three months after operation.

FIG. 2.—Arthroplasty. Voluntary flexion three months after operation.

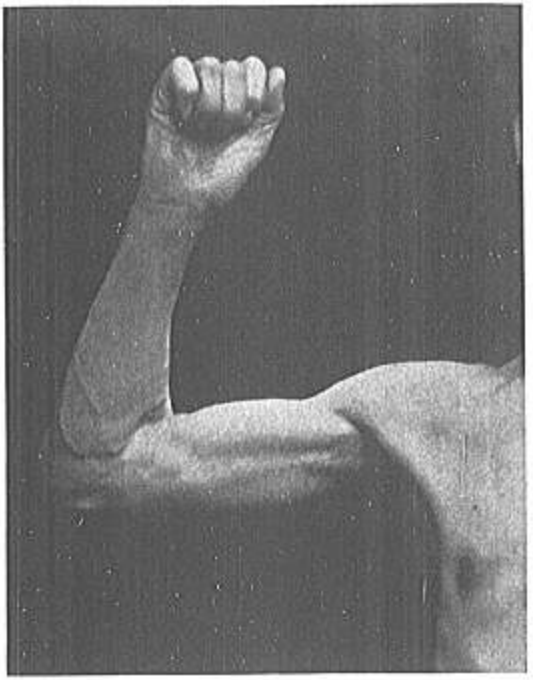

FIG. 3.—Arthroplasty. Voluntary flexion one year four months after operation. Note flexion of fingers.

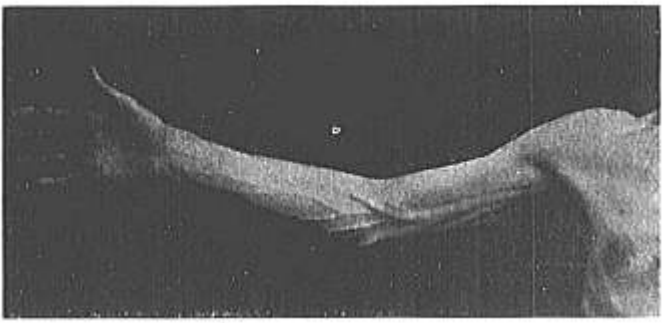

FIG. 4.—Arthroplasty. Voluntary extension one year four months after operation. Note extension of fingers.

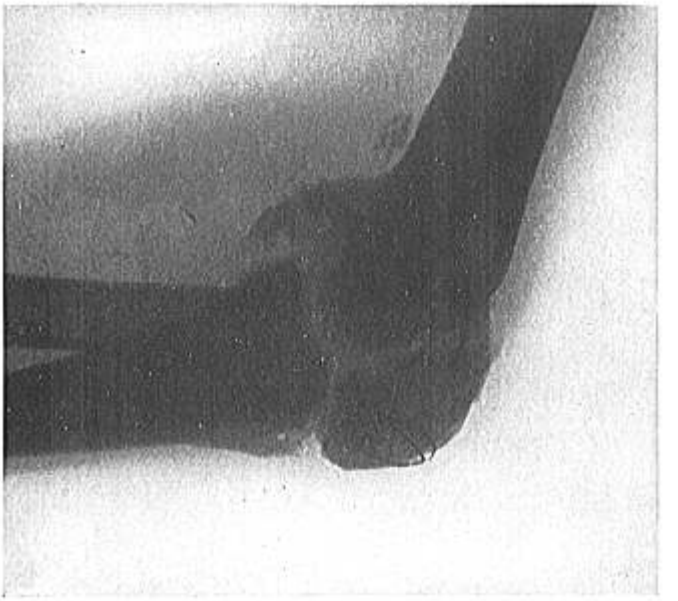

FIG. 5.—Arthroplasty. X-ray taken one year after operation. Note the line of section of olecranon to render easy access to joint. Note clear space corresponding to new elbow joint. Olecranon is solidly united to shaft of ulna.

trated the amount of flexion and extension of the fingers. Slight pronation and supination are possible.

The elbow does not trouble the man excepting for the small amount of limitation of motion. He has no pain and no discomfort with the joint locally that is of any importance. During wet weather there is a little feeling of discomfort about the joint, which he attributes to "rheumatism."

Fig. 5 shows the conditions as determined by the X-ray taken one year after operation. The olecranon process has united firmly to the shaft of the ulna by bony union; the wire is seen in place. It is broken at one point. The clear space of the joint is to be especially noted.

X-ray pictures taken previously to this one were not suitable for reproduction, but compared with this plate it is certain that there is no new formation of bone going on about the joint. The possible motion in the joint has not diminished since the first. Therefore it is reasonable to suppose that we have to-day in this case the final functional result of the operation.

There are certain facts of interest in connection with this operation of arthroplasty upon the elbow joint.

An ample incision greatly facilitates the operation. By section of the olecranon the exposure of the joint is easy, and the insertion of the triceps tendon is preserved intact. Consequently, after operation extension of the forearm is possible. The normal strength of extension is also maintained.

In the usual operation by a median posterior incision for complete excision of the elbow joint the power of extension is lost, or at most is very weak.

It is important, as Murphy of Chicago has pointed out, to clear the joint thoroughly of all adventitious tissue, as well as of any synovial membrane remaining. In a joint opened by the above method, in which the wound is closed by layer suture, there is no abnormal lateral mobility, no wobbling.

Murphy has found that the leaving of a thin layer of fat tissue attached to the fascia, to be used for the flap, is advantageous in the formation of a new joint.

The temporo-maxillary joint, the elbow joint, and the hip

joint are best suited to this form of plastic surgery. This procedure is best avoided in elderly individuals. It is adapted to the joints of children and young adults.

Persistence in passive and active movements after operation is essential to securing the greatest possible motion in a new joint formed by arthroplasty.